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25 October 2004

Your Ref: PCT/EP03/05505  
Our Ref: CE10051EP/PCT

The European Patent Office  
D-80298 München  
Germany

Dear Sir,

Re: PCT Patent Application no. PCT/EP03/05505 in the name of  
Motorola, Inc.

Reply to Written Opinion by the Preliminary Examining Authority

The Applicant hereby authorises that in this application and any patent resulting therefrom any fees and costs falling due shall be automatically debited from Deposit Account No. 28050531 in accordance with the Automatic Debiting Procedure established under point 7 of the Arrangements for Deposit Accounts.

In reply to the written opinion by the Preliminary Examining Authority of 17 August 2004, I herewith file in an amended set of claims 1 to 27 on page 31 to 36. It is requested that the Examiner replaces the present pages with these replacement pages.

Original Claims 1 and 26 (new claim 25) have been amended to clarify that the resource controller is operable to allocate a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in a different quality of service if the operator identity corresponds to a Mobile Virtual Network Operator. Support for the amendment can be found in the specification as a whole including original claim 19 which has been deleted. The remaining claims have been renumbered accordingly.

Proprietor R. Jepsen, M.Sc., PhD. European Patent Attorney, Chartered Patent Attorney

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No subject matter is to be considered as abandoned (e.g. with respect to the right to file a divisional application) by virtue of these amendments.

The Examiner suggests that the independent claims may lack novelty in view of the operations of a conventional GSM cellular communication system. The Applicant respectfully disagrees. It is noted that the Examiner's suggestions relate to the fact that a service may be available in one communication system (e.g. D2) but not in another (e.g. the D1 network). Thus, if the mobile station accesses the first network he may obtain a service and if he accesses the second network he may not obtain the service. However, even if the Examiner's suggestion that the availability or lack of availability of a service corresponds to varying a quality of service is accepted, it is respectfully submitted that the Examiner's suggestion illustrates a consequence of a mobile station accessing different communication networks and not a resource controller varying a quality of service in response to an operator identity.

In contrast to the provided example, the current invention relates to providing network based functionality for varying a quality of service in response to an operator identity. In accordance with the current invention, a resource controller may allocate resources providing different quality of service in response to an operator identity associated with a service. It is respectfully submitted that a conventional GSM cellular communication system does not comprise a resource controller which can vary a quality of service parameter in response to an operator identity.

Rather, as the Examiner describes, if a mobile station cannot access the first network (D2), the mobile station registers with an entirely different cellular communication system (D1). This communication system may then provide the service. Hence, although the mobile station may obtain a service when accessing one communication system and not when accessing another, neither of these communication systems comprise a resource controller which controls a quality of service by allocating a radio resource in response to an operator identity.

Furthermore, it is respectfully submitted that the examples provided by the Examiner clearly do not anticipate the amended independent claims. Specifically, a conventional GSM cellular communication system does not comprise any functionality for allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in a different quality of service if the operator identity corresponds to a Mobile Virtual Network Operator.

Rather it is respectfully submitted that in current cellular communication systems supporting MVNOs, the same processes and procedures are used for call management and resource allocation for the cellular network operator and the

MVNO and that any differentiation is provided by marketing, branding, sales channel, distribution etc. (Ref. e.g. page 5 last paragraph).

An objective problem solved by the current invention is thus how to allow an improved differentiation between network operators and MVNOs.

The current invention solves this problem by allowing a resource allocator in a (single) cellular communication system to provide different quality of service to network operators and MVNOs by allocating resource in response to operator identities. Thus, the current invention allows the same service (e.g. a voice service) to be provided with different quality of service levels for the network operator and MVNOs of the cellular communication system.

The Written Opinion cites a number of prior art documents

In particular, the Examiner further refers to EP 0 888 025 (D2). D2 discloses a system wherein different services may be provided to mobile stations having different service providers. In this system, an MSC is partitioned to provide different services to mobile stations (column 4 lines 45 to 47). The MSC comprises a partition table which associates the Mobile Identity Number (MIN) with different service providers. In particular, mobile stations having a MIN belonging to a first service provider is directed to a first HLR and mobile stations having an MIN belonging to a second service provider is directed to a second HLR. (Column 5 lines 1 to 31). The system allows each service provider to independently maintain subscriber profiles for its own subscribers (Column 6 line 2 to line 5). Telecommunication services may be provided in accordance with the subscriber profile information which is stored in HLR of the corresponding service provider.

However, it is respectfully submitted, that even if the described system provides different services for different service providers, it does not describe setting a resource to provide different quality of service for different operators in response to an operator identity. Hence, the present invention allows for the same service to be provided with different quality of service parameters by adjusting the allocated resource in response to an operator identity. Furthermore, D2 clearly does not disclose setting a resource corresponding to first quality of service parameter for a service provider identity corresponding to an operator of the cellular communication system and to a different quality of service if the network operator is a mobile virtual network operator. Indeed, it is respectfully submitted that D2 fails to disclose or consider MVNOs. Rather, D2 merely discloses provision of different services for different service providers. It is respectfully submitted that the technical problems and characteristics associated with integrating MVNOs and network operators are substantially different than for providing different services for different service providers. In particular, an MVNO does not operate or control the operation of the network but leaves this to the network operator. Specifically, an MVNO does not operate an independent HLR as required by the system of D2. Thus, the system of D2 cannot be used to

provide different quality of service levels in response to an operator identity corresponding to a network operator or an MVNO.

It thus respectfully submitted that D2 fails to disclose or suggest a resource controller allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in different quality of service if the operator identify corresponds to a mobile virtual network operator. It thus respectfully submitted that D2 does not provide the solution to the problem to the objective problem.

The examiner further refers to WO 02/061968 (D3). D3 discloses a system providing for control of the quality of service for service groups by controlling the power of each service group. However, it is respectfully submitted that D3 does not consider different service providers co-existing in the same cellular communication system. Indeed, the applicant notes that as the Examiner explicitly states, D3 refers only to service groups and does not mention or suggest different service providers. It is respectfully submitted, that the fact that D3 does not explicitly state that different service groups exclude service groups having different service providers, this clearly does not amount to a disclosure that different service groups belong to different service providers. Rather, it is respectfully submitted that an interpretation of the service groups corresponding to different service providers is wrong and any suggestion of this relies on an unallowable use of hindsight. It is furthermore respectfully submitted that D3 clearly does not disclose different providers co-existing in the same cellular communication system and specifically does not suggest any coexistence of network operators and MWNOS. Accordingly, D3 fails to disclose a resource controller allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in different quality of service if the operator identify corresponds to a mobile virtual network operator. It thus respectfully submitted that D3 does not provide the solution to the objective problem.

The Written Opinion furthermore cites WO 02/073366 (D1). D1 discloses an arrangement for dynamic account allocation wherein spectrum network availability is pulled together from different service providers in a central data base. However, it is submitted that D1 clearly fails to disclose a resource allocator which allocates resource resulting in different quality of service in response to an operator identity and in particular fails to disclose a resource controller allocating a first a resource controller allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in different quality of service if the operator identify corresponds to a mobile virtual network operator. It thus respectfully submitted that D1 does not disclose a solution to the objective problem.

The Written Opinion cites US2002/087674 (D4). D4 discloses a system for selecting a wireless network. It is respectfully submitted that as indicated in the second sentence of the abstract, the system disclosed by D4 is relate to selection of wireless networks from a plurality of wireless networks. Clearly, this is in contrast to the current invention which deals with the co-existence of MVNOs and a network operator of a cellular communications system. It is thus respectfully submitted that D4 fails to disclose a resource controller allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in different quality of service if the operator identify corresponds to a mobile virtual network operator. It thus respectfully submitted that D4 does not provide the solution to the objective problem.

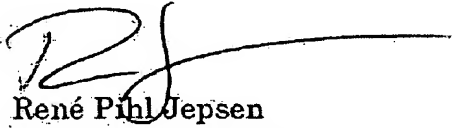
The Written Opinion cites WO 01/59986 (D5). D5 discloses a system for reserving resources in a wireline network from a wireless network. A service broker contacts a bandwidth broker to determine available resources in the wireline network and a service broker contacts a radio broker to determine the resources available in a particular wireless network. It is respectfully submitted that D5 is not concerned with the provision of different service providers in a cellular communication system and in particular is not concerned with providing differentiation between a network operator and an MVNO. In particular D5 fails to disclose a feature of a resource controller a resource controller allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in different quality of service if the operator identify corresponds to a mobile virtual network operator. It thus respectfully submitted that D5 does not provide the solution to the objective problem.

The written opinion cites WO 01/80589 (D6). D6 discloses a communication environment wherein a digital market arrangement allows a user to have dynamic access to a variety of network and service operators registered in the market place. It is respectfully submitted that D6 is not concerned with cooperation of different service providers within a single cellular communication system and in particular that D6 is not concerned with differentiation between a network operator and an MVNO. In particular it is respectfully submitted that D5 fails to disclose a resource controller allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in different quality of service if the operator identify corresponds to a mobile virtual network operator. It thus respectfully submitted that D6 does not provide the solution to the objective problem.

It is thus respectfully submitted that none of the cited documents disclose, hint or suggest any teaching solving the objective problem and that the claims herewith filed are novel and inventive over the prior art.

In conclusion, it is submitted that all of the Examiner's objections set forth in the communication have been addressed, and that this application now satisfies the requirements of the Patent Cooperation Treaty. Further consideration of the application is requested,

Yours faithfully

A handwritten signature in dark ink, appearing to be 'R. Jepsen', with a long horizontal stroke extending to the right.

René Pihl Jepsen  
European Patent Attorney  
Chartered Patent Agent(UK)  
Authorised Representative of the Applicant

## CLAIMS

1. A resource management apparatus for a cellular communication system; comprising

5 a resource controller operable to allocate a radio resource to a subscriber unit in response to an operator identity associated with a service of the subscriber unit,

wherein the resource controller is operable to allocate a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource  
10 resulting in a different quality of service if the operator identity corresponds to a Mobile Virtual Network Operator.

2. The resource management apparatus as claimed in claim 1 wherein  
15 the cellular communication system has a common radio access network resource divided into a first partition for a first operator and a second partition for a second operator, and the resource controller is operable to allocate resource from the first partition if the operator identity corresponds to the first operator and from the second partition if the  
20 operator identity corresponds to the second operator.

3. The resource management apparatus as claimed in claim 2, wherein the resource management controller comprises:

control means for independently controlling at least one quality of  
25 service parameter associated with the first partition of the common radio access network resource in response to a first preference parameter of the first operator, and at least one quality of service parameter associated with the second partition of the common radio access network resource in response to a second preference parameter of the second operator.

4. The resource management apparatus as claimed in claim 3 wherein the at least one quality of service parameter comprises at least one radio access network parameter chosen from the group of:

- a) a call blocking rate;
- 5 b) a call drop rate;
- c) an error rate;
- d) a delay;
- e) a throughput fairness; and
- f) a power control target.

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5. The resource management apparatus as claimed in claim 3 or 4, wherein the control means comprise a first quality of service controller for independently controlling the at least one quality of service parameter associated with the first partition and a second quality of service controller  
15 for independently controlling the at least one quality of service parameter associated with the second partition.

6. The resource management apparatus as claimed in claim 5 wherein the first quality of service controller comprises first input means for  
20 receiving control input from the first operator and the second quality of service controller comprises second input means for receiving control input from the second operator.

7. The resource management apparatus as claimed in claim 6 wherein  
25 each of the first and second quality of service controllers has an individually associated operations and maintenance controller.

8. The resource management apparatus as claimed in claim 5 to 7 wherein the first quality of service controller comprises a first resource  
30 allocator for allocating resource associated with the first partition and the second quality of service controller comprises a second resource allocator for allocating resource associated with the second partition.



9. The resource management apparatus as claimed in claim 8 wherein the first and second resource allocators comprise a traffic scheduler.
- 5 10. The resource management apparatus as claimed in claim 8 wherein the first and second resource allocators comprise admission controllers.
11. The resource management apparatus as claimed in claim 5 to 10 wherein the first quality of service controller comprises a first power  
10 control controller for controlling transmit powers associated with the first partition and the second quality of service controller comprises a second power control controller for controlling transmit powers associated with the second partition.
- 15 12. The resource management apparatus as claimed in claim 3 to 11 wherein the control means is operable to control the at least one quality of service parameter associated with the first partition and the at least one quality of service parameter associated with the second partition in  
20 response to at least one common parameter for the first and second partition.
13. The resource management apparatus as claimed in claim claimed in claim 12 wherein the at least one common parameter is a total resource usage for the first and second partition.
- 25 14. The resource management apparatus as claimed in any of the previous claims 2 to 13 wherein the partitioning of resource in said first and second partition is different in different regions.
- 30 15. The resource management apparatus as claimed in any of the previous claims 2 to 14 wherein the resource management apparatus

comprises means for dynamically varying the partitioning of resource into said first and second partition.

5 16. The resource management apparatus as claimed in claim 15 wherein the partitioning of resource into the first and second partition is in response to a resource usage in said first and second partition.

10 17. The resource management apparatus as claimed in any of the previous claims 2 to 16 wherein the resource management apparatus further comprises means for presenting relative usage levels of the first and second partition respectively.

15 18. The resource management apparatus as claimed in any of the previous claims 2 to 17 wherein both the first and second partition comprises resource associated with equipment shared between the first and second operator.

20 19. The resource management apparatus as claimed in any of the previous claims 1 to 18 wherein the radio resource comprises a frequency resource.

25 20. The resource management apparatus as claimed in any of the previous claims 1 to 19 wherein the radio resource comprises a code resource.

30 21. The resource management apparatus as claimed in any of the previous claims 1 to 20 wherein the radio resource comprises a power resource.

22. A cellular communication system comprising a resource management apparatus as claimed in any of the previous claims.

23. A cellular communication system as claimed in claim 22 further comprising means for associating the operator identity to a service of a subscriber unit when initiating the service.

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24. A cellular communication system as claimed in claim 22 or 23 wherein a radio access network is shared between the different operators.

25. A method of resource management in a cellular communication system; comprising

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allocating a radio resource to a subscriber unit in response to an operator identity associated with a service of the subscriber unit,

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wherein the step of allocating comprises allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in a different quality of service if the operator identity corresponds to a Mobile Virtual Network Operator.

20

26. A method of resource management as claimed in claim 25 wherein the cellular communication system has a common radio access network resource divided into a first partition for a first operator and a second partition for a second operator and the step of allocating a radio resource comprises allocating resource from the first partition if the operator identity corresponds to the first operator and from the second partition if the operator identity corresponds to the second operator.

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27. A method of resource management as claimed in claim 26 wherein the step of allocating a radio resource comprises independently controlling at least one quality of service parameter associated with the first partition of the common radio access network resource in response to a first preference parameter of the first operator, and at least one quality of service parameter associated with the second partition of the common

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radio access network resource in response to a second preference parameter of the second operator.

## CLAIMS

1. A resource management apparatus for a cellular communication system; comprising
- 5 a resource controller operable to allocate a radio resource to a subscriber unit in response to an operator identity associated with a service of the subscriber unit,
- wherein the resource controller is operable to allocate a first radio resource resulting in a first quality of service if the operator corresponds to
- 10 a cellular communication system operator such that and a second radio resource resulting in a different quality of service if the operator identity corresponds to a Mobile Virtual Network Operator is achieved for different operators.
- 15 2. The resource management apparatus as claimed in claim 1 wherein the cellular communication system has a common radio access network resource divided into a first partition for a first operator and a second partition for a second operator, and the resource controller is operable to allocate resource from the first partition if the operator identity
- 20 corresponds to the first operator and from the second partition if the operator identity corresponds to the second operator.
3. The resource management apparatus as claimed in claim 2, wherein the resource management controller comprises:
- 25 control means for independently controlling at least one quality of service parameter associated with the first partition of the common radio access network resource in response to a first preference parameter of the first operator, and at least one quality of service parameter associated with the second partition of the common radio access network resource in
- 30 response to a second preference parameter of the second operator.

4. The resource management apparatus as claimed in claim 3 wherein the at least one quality of service parameter comprises at least one radio access network parameter chosen from the group of:

- a) a call blocking rate;
- 5 b) a call drop rate;
- c) an error rate;
- d) a delay;
- e) a throughput fairness; and
- f) a power control target.

10

5. The resource management apparatus as claimed in claim 3 or 4, wherein the control means comprise a first quality of service controller for independently controlling the at least one quality of service parameter associated with the first partition and a second quality of service controller  
15 for independently controlling the at least one quality of service parameter associated with the second partition.

6. The resource management apparatus as claimed in claim 5 wherein the first quality of service controller comprises first input means for  
20 receiving control input from the first operator and the second quality of service controller comprises second input means for receiving control input from the second operator.

7. The resource management apparatus as claimed in claim 6 wherein  
25 each of the first and second quality of service controllers has an individually associated operations and maintenance controller.

8. The resource management apparatus as claimed in claim 5 to 7 wherein the first quality of service controller comprises a first resource  
30 allocator for allocating resource associated with the first partition and the second quality of service controller comprises a second resource allocator for allocating resource associated with the second partition.

- 9:     The resource management apparatus as claimed in claim 8 wherein  
the first and second resource allocators comprise a traffic scheduler.
- 5     10.   The resource management apparatus as claimed in claim 8 wherein  
the first and second resource allocators comprise admission controllers.
11.   The resource management apparatus as claimed in claim 5 to 10  
wherein the first quality of service controller comprises a first power  
10   control controller for controlling transmit powers associated with the first  
partition and the second quality of service controller comprises a second  
power control controller for controlling transmit powers associated with  
the second partition.
- 15   12.   The resource management apparatus as claimed in claim 3 to 11  
wherein the control means is operable to control the at least one quality of  
service parameter associated with the first partition and the at least one  
quality of service parameter associated with the second partition in  
response to at least one common parameter for the first and second  
20   partition.
13.   The resource management apparatus as claimed in claim claimed in  
claim 12 wherein the at least one common parameter is a total resource  
usage for the first and second partition.
- 25   14.   The resource management apparatus as claimed in any of the  
previous claims 2 to 13 wherein the partitioning of resource in said first  
and second partition is different in different regions.
- 30   15.   The resource management apparatus as claimed in any of the  
previous claims 2 to 14 wherein the resource management apparatus

comprises means for dynamically varying the partitioning of resource into said first and second partition.

16. The resource management apparatus as claimed in claim 15  
5 wherein the partitioning of resource into the first and second partition is in response to a resource usage in said first and second partition.

17. The resource management apparatus as claimed in any of the  
previous claims 2 to 16 wherein the resource management apparatus  
10 further comprises means for presenting relative usage levels of the first and second partition respectively.

18. The resource management apparatus as claimed in any of the  
previous claims 2 to 17 wherein both the first and second partition  
15 comprises resource associated with equipment shared between the first and second operator.

~~19. The resource management apparatus as claimed in any of the  
previous claims 1 to 18 wherein the first operator is a cellular  
20 communication system operator and the second operator is a Mobile  
Virtual Network Operator.~~

~~1920. The resource management apparatus as claimed in any of the  
previous claims 1 to 189 wherein the radio resource comprises a frequency  
25 resource.~~

~~201. The resource management apparatus as claimed in any of the  
previous claims 1 to 1920 wherein the radio resource comprises a code  
resource.~~

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212. The resource management apparatus as claimed in any of the previous claims 1 to 201 wherein the radio resource comprises a power resource.

5 | 223. A cellular communication system comprising a resource management apparatus as claimed in any of the previous claims.

234. A cellular communication system as claimed in claim 223 further comprising means for associating the operator identity to a service of a  
10 | subscriber unit when initiating the service.

245. A cellular communication system as claimed in claim 223 or 234 wherein a radio access network is shared between the different operators.

15 | 256. A method of resource management in a cellular communication system; comprising

allocating a radio resource to a subscriber unit in response to an operator identity associated with a service of the subscriber unit,

20 | wherein the step of allocating comprises allocating a first radio resource resulting in a first quality of service if the operator corresponds to a cellular communication system operator and a second radio resource resulting in a different quality of service if the operator identity corresponds to a Mobile Virtual Network Operator.  
~~such that different quality of service is achieved for different operators.~~

25 |

267. A method of resource management as claimed in claim 26-25 wherein the cellular communication system has a common radio access network resource divided into a first partition for a first operator and a second partition for a second operator and the step of allocating a radio  
30 | resource comprises allocating resource from the first partition if the operator identity corresponds to the first operator and from the second partition if the operator identity corresponds to the second operator.

2827. A method of resource management as claimed in claim 267 wherein  
the step of allocating a radio resource comprises independently controlling  
at least one quality of service parameter associated with the first partition  
5 of the common radio access network resource in response to a first  
preference parameter of the first operator, and at least one quality of  
service parameter associated with the second partition of the common  
radio access network resource in response to a second preference  
parameter of the second operator.

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